teriorly from supplemental preopercular spine, terminating as a spine beneath center of orbit in small specimens; in large specimens ridge present, but spine absent or vestigial. Nasal and preocular spines absent. Occipital groove deep. Cleithral spine long, extending posteriorly past distal ends of opercular and preopercular spines. Head proportionately longer in small specimens, 20-30 mm SL (48-51% SL), than in large specimens, 75-95 mm SL (37-43% SL). Interorbital width very narrow (Fig. 5). Body depth at first dorsal spine slender in comparison to *B. militaris* (Figs. 1, 4).

Coloration of specimens preserved in solution of 10 per cent formalin and IONOL CP-40: Body orange; ventral edge of pectoral fin and tips of branched rays dark; pectoral dusky orange with first (dorsalmost) ray not banded with black and white. Pigmentation: Large black spot near edge of membrane between fourth and fifth dorsal spines, usually absent in specimens larger than 60 mm SL; distal ends of branched rays on lower edge of pectoral fin dark; dark spot at base of last dorsal soft ray. There are indications that *Bellator ribeiroi* has spawning colors as brilliant as those reported for *B. militaris* by Longley and Hildebrand (1941, p. 174).

Common Name. Ribeiro's Searobin.

Etymology. This species is named in honor of the Brazilian ichthyologist, Alipio de Miranda Ribeiro, who contributed greatly to the knowledge of the marine fauna of South America.

Range. The range of *B. ribeiroi* is known to extend from Colombia to Brazil. It has been taken at depths ranging from 22 to 42 fathoms, in bottom water temperatures of 74° to 84°F. (records for 3 stations only).

The closely associated cognate, *B. militaris,* ranges from Cape Lookout, North Carolina, south in the western Atlantic through the Gulf of Mexico to off Cabo Catoche, Yucatan, Mexico (Ginsburg, 1950, p. 527). It is not known whether *B. ribeiroi* and *B. militaris* occur sympatrically off Central America, between Colombia and Yucatan, or are absent from this area. The largest specimens of *B. ribeiroi,* like *B. militaris* (Ginsburg, 1950, p. 527), are from the most southern part of its known range.

Species. The genus *Bellator* is endemic to the western Atlantic Ocean, and is now known to include four species. *Bellator ribeiroi* may be distinguished from the other three species by the following key.

I. Cleithral spine large, extending posteriorly past tip of opercular spine; scales present on chest anterior to a line between the median rays of the pelvic fins.

A. Upper (dorsalmost) one or two rays of pectoral banded black and white; supplemental preopercular spine usually large; interorbital broad, average 11.8% SL; first and second dorsal spines elongated in many specimens (neither spine elongated in others)..... *Bellator militaris* (Goode and Bean)

AA. Upper rays of pectoral lacking black and white bands; supplemental preopercular spine small or absent; interorbital area narrow, average 7.1% SL; only first dorsal spine elongated in many specimens (no elongated spine in others) ..... *Bellator ribeiroi*, new species

II. Cleithral spine small, not extending past tip of opercular spine; lacking scales on chest.

B. Posterior upper portion of eyeball with tabs or tentacles; first free ray of pectoral much shorter than pectoral length; outer face of pectoral with alternating patches of light and dark color ..... *Bellator egretta* (Goode and Bean)

BB. Posterior upper portion of eyeball without tabs or tentacles; first free ray of pectoral considerable longer than pectoral length; outer face of pectoral dusky or with an elongated black spot ..... *Bellator brachychir* (Regan)

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THREADFIN SHAD IN TAMPA BAY, FLORIDA

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The threadfin shad, *Dorosoma petenense* (Günther), has in recent years become widely introduced as a forage species in fresh-water ponds, lakes, rivers, and reservoirs. It is distributed naturally throughout Florida and in brackish waters of the eastern Gulf coastal region (Carr and Goin, 1955). Little published information is available on its ecology in the estuarine waters of Florida, and its occurrence in Tampa Bay has not previously been reported.

On March 11, 1963, and March 24 and 25, 1965, threadfin shad were collected in Old Tampa Bay at the base of Alligator Lake dam. The lake is a fresh-water impoundment of approximately 85 acres, located just south of Safety Harbor, on the northwest side of Old Tampa Bay. A total of 79 fish were caught by dip net and 2 with a 70-foot beach seine. Standard length (SL) of males ranged in length from 114 to 162 mm (average, 136), and females from 121 to 179 mm (average, 155). Most of the females were gravid. The unfertilized eggs were light yellow, semiadhesive, and ranged from 0.68 to 0.75 mm in diameter. All males had enlarged testes, and the milt was of low viscosity. The number of eggs in a fish 126 mm long totaled 6,210 and in a fish 169 mm long, 21,007.

The shoreline, bottom sediments, and rocks at the base of the dam showed no evidence of recently spawned eggs. Threadfin shad are reported to spawn in areas of heavy aquatic vegetation; eggs have been noted on the roots of water hyacinths, submerged algae, and pilings (Berry, Huish, and Moody, 1956; McLane, 1955).

Several hundred of these fish were observed during high tide on March 25, 1965, at the base of the dam. Threadfin shad are apparently attracted by water currents at the downstream faces of dams and similar obstructions during the spring and fall (Miller, 1963; Parsons and Kimsey, 1954). Water temperature was 22.8 C (63.0 F), and salinity was 8.73 o/oo. No fish were seen during low tide, when the water depth at the base of the dam was less than 3 feet.

Most of the stomachs were nearly empty, although some diatoms (*Chaetoceros* spp.), sand, and unidentifiable organic detritus were noted. The species is reported to feed mainly on plankton (diatoms, copepods, and cladocerans) when in fresh water. Haskell (1959) suggested that threadfin shad are both planktonic and bottom feed-

ers. In the Salton Sea, California, threadfin shad feed on the fry of *Bairdiella icistius* (Miller, 1963).

Mortality of threadfin shad from reduced water temperature has been reported by some investigators. Hubbs (1951) assumed that the minimum temperature tolerance for *Signalosa (= Dorosoma) petenensis atchafalayae* in the Colorado River was between 12.2 and 14.2 C (54 and 57.6 F), although experiments by Parsons and Kimsey (1954) showed some survival of this fish below 45 F (7.2 C). No mortality of threadfin shad was observed during a winter kill at the sampling site in Old Tampa Bay and other areas in Tampa Bay on December 13-14, 1962, when water temperature reached a record low of 9.6 C or 49.3 F (Rinckey and Saloman, 1964). These data indicate that the normal seasonal temperature range (10 to 35 C — 50.0 to 95.0 F) in Old Tampa Bay probably does not limit threadfin shad.

The average size of the adult fish taken in this study was above that reported from fresh-water lakes in Florida (Berry et al., 1956). The largest female from Old Tampa Bay measured 179 mm SL; this size may indicate that larger fish prefer brackish water. Miller (1963) stated that fish smaller than 100 mm were usually taken in salinities of less than 15 o/oo, and those from 100 to 150 mm occurred more frequently in salinities of 15 to 30 o/oo. The salinity range in Old Tampa Bay is generally between 15 and 25 o/oo (Saloman, Finucane, and Kelly, 1964).

Scales indicated that the fish were in age-group I, between 1 and 2 years old. Generally, this species has a short life, for few individuals seem to live longer than 2 years (Miller, 1963; Parsons and Kimsey, 1954). The brief life span may be the result of spawning mortality, as noted by Berry et al. (1956), who observed two mass mortalities of threadfin shad in Florida lakes that were attributed to spawning.

The origin of this species in Old Tampa Bay is unknown. According to local residents, threadfin shad were stocked in Alligator Lake as forage food for largemouth bass, *Micropterus salmoides floridanus*. The dam has been washed out several times since 1959; each time the lake was partially or completely drained. Possibly threadfin shad were released into Old Tampa Bay during the wash-outs. Springer and Woodburn (1960) reported *D. petenense* from Lake Maggiore (in St. Petersburg), which has an outlet into lower Tampa Bay. Either of these two lake populations could